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EXAMINER

CLEVELAND, MICHAEL B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 05/17/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

09/125,128

Applicant(s)

IGUCHI ET AL.

Examiner

Michael Cleveland

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 April 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31, 33, 35, 37-41, 43-46, 48-51 and 53-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31, 33, 35, 37-41, 43-46, 48-51 and 53-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-31, 33, 35, 37-41, 43-46, 48-51, and 53-57 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1, 2, and 33: The full scope of the newly presented limitations “a pitch of 360 microns or less” and “arranged in line having a length of 288 mm” are not supported by the specification as originally filed. The presence of examples within a claimed range does not fully support the entirety of the range.

The remaining claims are rejected merely for containing the new limitations of parent claims 1, 2, and 33.

3. Claims 1, 2, 7, 12, 13, 19, 20, 33, 35, 44, and 58 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, 2: It is not clear what noun “having a length of 288 mm or more” modifies. Based on Applicant’s remarks, the Examiner has treated the claim as at least inclusive of the length of a line of a plurality of outlet holes.

Claim 7: Applicant’s amendment has rendered the claim grammatically unclear. It appears that “outlet holes” should be moved before “wherein”. The claim has been interpreted accordingly.

Claim 12: Applicant’s amendment has rendered the claim grammatically unclear. The first “wherein...” clause is unclear. The clause refers to a distance, and in previous incarnations of the claim, the “distance” has referred to that between the outlet holes and the top surfaces of the barrier ribs. Accordingly, the clause appears to be predominantly redundant and has been largely ignored. (The term “glass substrate” is still treated as an additional limitation.)

Claim 13: The claim is unclear because, on first scan, it suggests that the passage from supply sources to the outlet holes for different pastes are connected, but it is unclear how such an embodiment could supply different colored pastes to different holes. Upon further consideration, the phrasing is inclusive of the situation where different holes connected internally to different supply sources are part of the same apparatus, and has been so treated for purposes of examination. However, the claim should be revised so that such appears to be the meaning of the claim on first scan.

Claim 19: The phrase "before that relative movement" is unclear because it is unclear whether "that" refers to a previously mentioned step (e.g., starting the jet application) or whether it is designed to indicate antecedent basis "that relative movement" referring to previously described relative movement. For purposes of applying art, the latter interpretation has been adopted, primarily because the first is not supported by the specification. If such is intended, the Examiner recommends use of a more common identifier of antecedent basis, such as "the" or "said".

Claim 20: The term "50 wt% grain size" is unclear. The Examiner has interpreted the claim as stating "wherein 50 wt. % of each phosphor powder has a grain size of 0.5 to 10 microns...". If such is Applicant's intent, the examiner recommends changing the claim to so state. If not, Applicant should clarify the meaning of the term and provide support for the asserted meaning.

Claim 33: It is not clear what noun "of 288 mm or more" modifies. Based on Applicant's remarks, the Examiner has treated the claim as at least inclusive of the length of a line of a plurality of outlet holes.

Claims 35 and 44: Apparatus claims must depend only on the characteristics of the apparatus and not on the intended use of the apparatus. Thus, claims 35 and 44 are vague and indefinite because, if the claims were granted, infringement would necessarily be determined in part by the features of the substrate and/or intended use of the apparatus.

Claim 58: Applicant's amendment has rendered the claim grammatically unclear. The first amendment to include "are provided" does not make sense. The second inclusion of "are provided" should apparently be "is provided".

#### *Specification*

The amendment filed 4/18/2002 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new

matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: The addition to p. 74 is not clearly supported by the spec. It is not clear that in the Experiment described that all the holes were in a single line and therefore, it is not clear that the calculation is supported by the example.

Applicant is required to cancel the new matter in the reply to this Office Action.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-7, 9, 11, 16, 21-22, 26 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinoda et al. (U.S. Patent 5,674,553, hereafter '553).

Claims 1-2: '553 teaches a method of applying a phosphor paste containing a phosphor powder and an organic solvent through a plurality of outlet holes onto a substrate with a plurality of barrier ribs to form a phosphor layer (col. 19, line 66-col. 20, line 7 and Figs. 22A-C). Three pastes may be used to form red, green, and blue stripes. The pastes are then heated to form the phosphor layers (col. 20, line 35-48). '553 teaches that the desired phosphor film thickness is preferably from 10-50 microns (col. 19, lines 33-48). While there is no teaching regarding the ratio of the thickness of the layer on the bottom (T1) and the side wall (T2), any values independently chosen from the range necessarily produce a ratio of  $0.2 \leq T1/T2 \leq 5$ . '553 explicitly teaches a barrier pitch of 220 microns (col. 19, lines 49-60).

'553 does not explicitly teach that the screen (a paste applicator with a plurality of holes) is at least 288 mm (approx. 11 inches) in length. However, the Examiner takes official notice that plasma display screens at least 12 inches in width were known at the time of the invention. The Examiner further takes official notice that it was well known at the time of the invention to have used a single screen covering the entire substrate in order to coat the entire substrate in a single pass in order to have prevented nonuniformities caused by realigning the screen over different portions of the substrate. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed the screen printing of '553 to form a plasma display panel with a width of at least 12 inches, and to have used a screen at least the size of that substrate to have performed the printing in order to have prevented

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nonuniformities caused by realigning the screen with a reasonable expectation of success. Such a screen would therefore have had a width (i.e., length of a line of holes in one dimension) of at least 12 inches.

Claim 30: The width and pitch of the ribs control the resolution of the display panel. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized them for the desired resolution. '553 explicitly teaches a barrier pitch of 220 microns, widths of 40-80 microns (col. 19, lines 49-60) and height of 100 microns (col. 19, line 8-17).

Claims 3 and 11: As described above, '553 teaches a pitch of 220 microns. Also, the electrode width is taught to be 60-70 microns. In such an embodiment, the spacing between ribs must be greater than 60 microns but less than 220. '553 teaches that it is undesired to deposit the phosphor paste on top of the barriers. Thus, the outlet holes should be smaller than the pitch.

'553 teaches that screens with hole openings of 60 microns may be used to print other pastes (col. 19, lines 49-60). One of ordinary skill in the art would have expected to be able to use such a screen to print a phosphor paste with the expectation of success. In such a case, the diameter of the holes would be less than the spacing between the ribs. Both would be between 10 and 500 microns.

Claim 4: A screen printer is a paste applicator with a plurality of holes in a flat screen.

Claims 5-7: The number of holes depends on the size of the panel to be coated. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have determined the desired number of holes prior to coating.

Claim 9: The openings are formed at a pitch triple that of the ribs (col. 19, lines 61-65).

Claim 16: The phosphors are applied consecutively and dried (col. 20, lines 36-48).

Claim 21: The phosphor paste should contain 10-50 wt. % phosphor and may contain a resin binder and organic solvent. The relative concentrations of the thickener and solvent will necessarily affect the viscosity of the paste (and therefore the printing effectiveness) and the necessary drying time. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the concentrations of the phosphor, binder, and solvent to control the rheological properties and drying time of the process.

Claim 22: The paste may include a cellulose resin (col. 20, lines 5-7).

Claim 26: The phosphor height, width, and pitch and phosphor concentration are all result-effective variables, as discussed above. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the parameters to have controlled the resolution and rheological properties.

Claim 31: The ribs may be black on top (col. 12, lines 59-64).

6. Claims 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over '553 as applied to claims 1 and 2 above, and further in view of Osaka et al. (U.S. Patent 5,277,840, hereafter '840).

'553 does not teach Applicant's specifically claimed ranges of the grain size, specific surface area, or paste viscosity.

'840 teaches that the particle size and viscosity of phosphor pastes are known to affect the light-emitting characteristics and resolution (col. 3, lines 8-39 and Abstract). The size distribution necessarily affects the specific surface area. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the size distribution, specific surface area and paste viscosity of '553 for the best light-emitting characteristics and resolution.

7. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over '553 as applied to claims 1 and 2 above, and further in view of Yamaura et al. (U.S. Patent 4,680,231, hereafter '231).

'553 does not teach the use of a photosensitive component in the phosphor paste. '231 teaches that phosphor pastes may include photosensitive components in order to perform further photolithographic processing. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included a photosensitive component in the phosphor paste of '553 in order to make the process more flexible by allowing further patterning by photolithography (for example, to remove, undesired material from the tops of the barrier ribs) (Abstract, col. 6, line 42-col. 7, line 10).

8. Claims 1-9, 11-17, 19, 21-22, 26-27, and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto et al. (U.S. Patent 5,921,836, hereafter '836) in view of Shinoda '553.

'836 teaches a method of forming a plasma display panel using a paste applicator with a plurality of nozzles (and therefore a plurality of holes) to deposit a phosphor paste including an organic binder to form a phosphor layer on a substrate with a plurality of barrier ribs (col. 4, lines 16-39). The phosphors may be of three colors (red, green, and blue), applied as stripes,

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and dried (col. 1, line 58-col. 2, line 12). The dried films coat the substrate, anode, and sides of the barrier ribs. See, for instance, Fig. 1. The reference is silent as to the phosphor layer thickness, and therefore does not teach the thickness of the coating on the bottom (T1) and the side wall (T2).

However, '553 teaches that the thickness of the phosphor layer obtained after drying is a result-effective parameter and that there is a trade-off between brighter displays achieved by thicker layers and lower discharge initialization voltages necessary for thinner layers. '553 teaches that layers of 10-50 microns are preferred. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the method of '836 to have produced phosphor layer thicknesses of 10-50 microns. While there is no teaching regarding the ratio of the thickness of the layer on the bottom (T1) and the side wall (T2), any values independently chosen from the preferred range necessarily produce a ratio of  $0.2 \leq T1/T2 \leq 5$ .

'836 does not explicitly teach a barrier rib pitch of less than 360 microns and an applicator length of at least 288 mm. '836 suggests a spacing (S) between barrier ribs of 170 microns (col. 4, lines 36-39) and a rib width (W) of 50 microns (col. 8, lines 1-12), thereby suggesting a pitch ( $P=S+W$ ) of 220 microns. (This value is consonant with the explicit teaching of '553 (col. 19, lines 49-60) and is less than 360 microns). '836 explicitly teaches that there may be 5-30 nozzles (col. 4, lines 26-39). However, given that there are many stripes to be formed (see, e.g., col. 8, lines 1-2), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used more nozzles in order to have decreased processing time. As described above, '836 suggests a rib pitch of 220 microns, and each that there may be 1920 grooves, suggesting a substrate width of  $(0.220 \text{ mm} * 1920 = 422 \text{ mm})$ . Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an applicator with a line of holes approximately 422 mm long in order to have coated the substrate in a single pass in order to have decreased processing time.

Claim 3: '836 suggests using a substrate with a spacing S of 170 microns and D of 100 microns (col. 4, lines 36-39).

Claim 4: The applicator holes may be formed as nozzles (col. 4, lines 26-39).

Claims 5-7: '836 explicitly teaches that there may be 5-30 nozzles (col. 4, lines 26-39). However, given that there are many stripes to be formed (see, e.g., col. 8, lines 1-2), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used more nozzles in order to have decreased processing time.



Claims 8, 13, 21, 26-27, and 30: '836 does not explicitly teach Applicant's claimed ranges of the outlet hole pitch, phosphor paste compositions or viscosities, barrier rib characteristics, and spacing between stripes. The resolution is affected by variables such as the distance between stripes of different colors, barrier height, width, and pitch. The viscosity of the paste is affected by the composition of the paste (col. 4, lines 16-20, col. 7, line 66-col. 8, line 19). The outlet hole pitch is determined by the rib pitch (col. 11, lines 41-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized these characteristics for the desired resolution and paste thickness.

Claims 14-15: '836 does not explicitly teach Applicant's claimed multiple paste applicators. In the embodiment of Fig. 18, the pastes are applied in opposite directions. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied them both simultaneously with independent applicators and at the same speed to have reduced the total processing time.

Claim 9: The hole pitch may be six times the barrier pitch (col. 11, lines 45-53).

Claim 11: '836 suggests a hole diameter of 100 microns (col. 4, lines 30-34).

Claim 12: The clearance (distance between the nozzle tips and barrier top) should be kept constant. Typical values are 0.1-0.2 mm (col. 6, lines 3-13).

Claim 16: Each color phosphor paste may be applied and then dried separately (col. 1, line 58-col. 2, line 12).

Claim 17: The substrate and nozzle may be moved parallel to each other (col. 4, lines 49-53).

Claim 19: '836 does not explicitly teach Applicant's claimed order of application. The coating process begins outside of the region of effective display (col. 6, lines 35-41), apparently so that nonuniformities during the beginning of the deposition are not seen in the final product. By extension, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have continued movement beyond the effective region at the end of each stripe as well to prevent nonuniformities at the end of the process. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have begun moving the nozzle before deposition and stopped after deposition ceased in order to avoid nonuniformities in the effective region of the display panel.

Claim 22: The paste may contain ethyl cellulose (a binder resin) (col. 4, lines 16-20).

Claim 31: The top of the ribs may be colored black (col. 5, line 59-col. 6, line 2).

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9. Claims 33, 35, 37-41, 43-44, 48-49, 51, 53-56, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 as applied to claims 1-2 above, and further in view of Ravi-Chandar et al. (U.S. Patent 5,656,574, hereafter '574).

'836 teaches the method of claims 1 and 2 as described above. '836 teaches an apparatus comprising a platform for fixing the substrate, a paste applicator with a plurality of holes, a supply means for supplying the paste to the applicator and a moving means to move the platform substrate and applicator relative to each other (col. 4, lines 8-56). The distance between the ribs and nozzle tips is kept constant (col. 6, lines 3-14). The apparatus has means to adjust the inclination degree of the applicator nozzles (col. 12, lines 40-49). '836 does not explicitly teach an applicator with a line of holes at least 288 mm long. However, such a length (for example, ~422 mm) would have been obvious as described with regard to claims 1 and 2, above. '836 does not describe the use of outlet holes with a length/diameter ratio of 0.1-600.

The Examiner takes official notice that the length to diameter ratio of a nozzle for dispensing pastes is known to affect the rheological properties and therefore the dispensing efficiency of the nozzle. See, for instance, the extrusion process described in '574, col. 6, lines 40-49. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the length-to-diameter ratio of the paste applicator of '836 for the optimum rheological properties.

Claim 35: '836 suggests using a substrate with a spacing S of 170 microns and D of 100 microns (col. 4, lines 36-39). The shape of the holes is a design choice. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a non-circular nozzle with the expectation of similar results.

Claims 37-38: Figs. 15 and 16 suggest that the outlet holes are on the same plane and identical in form.

Claims 39-40: '836 suggests using 5-30 nozzles (col. 4, lines 34-37). However, given that there are many stripes to be formed (see, e.g., col. 8, lines 1-2), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used more nozzles in order to have decreased processing time.

Claim 41: The hole pitch is determined by the pitch between the ribs, which is itself a cause-effective variable (col. 11, lines 45-53).

Claim 43: '836 suggests a hole diameter of 100 microns (col. 4, lines 30-34).

Claim 44: '836 teaches that the apparatus has sensors to detect the ribs and to adjust the substrate accordingly (col. 7, lines 8-32). Thus it would have been obvious to one of ordinary

skill in the art at the time the invention was made to have positioned the nozzles above the centers of the grooves in order to evenly distribute the phosphor onto the barrier walls.

Claim 49: Figs. 16 and 22 suggest a distribution system in which one storage section is used to dispensed paste to multiple nozzles. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used multiple nozzles to distribute the multiple phosphors simultaneously in order to reduce the processing times. In such an embodiment, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have three staggered sets of nozzles, each set with its own distribution system to supply different colored phosphors in order to reduce the processing time by applying all the stripes simultaneously.

Claims 48 and 58: Multiple applicators may be provided to apply the phosphors in series (Fig. 13).

Claim 51: The apparatus may have means to detect the position of the tips of the outlet holes and the tops of the barrier ribs (col. 6, lines 3-20) and controlling the area of application (col. 6, lines 3-50).

Claim 53: The apparatus has means to detect the position of the phosphor paste (col. 7, lines 24-32).

Claim 54-55: The apparatus comprises means to recognize alignment marks that determine the positions of the ribs and grooves (i.e., spaces) so that the phosphor may be deposited in the grooves (col. 5, line 48-col. 6, line 2).

Claim 56: Clogging of the nozzles may occur (col. 9, lines 59-62). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included means to clean the nozzle to remove such clogs.

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto '836 in view of Shinoda '553 as applied to claims 1 and 2 and further in view of Ravi-Chandar '574 for the same reasons that '574 is applied to claim 33.

11. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over '836 in view of Ravi-Chandar '574 as applied to claim 33 and further in view of Mettenbrink (U.S. Patent 4,775,080, hereafter '080).

'836 and '574 are combined as described above. '836 also teaches that the apparatus comprises pressure adjusting and controlling means to dispense the paste (col. 7, lines 48-54). '836 does not teach that the pressure may be designed to be negative. However, clogging of the

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nozzle is taught as disadvantageous (col. 9, lines 59-62). It is well known to prevent the formation of dried beads of material that clog nozzles by applying a vacuum to the nozzle when the dispensing stops. As an example, '080 teaches the operation of a toothpaste dispenser, in which a vacuum is formed in the nozzle that avoids the formation of a plug of hardened paste outside the nozzle (col. 8, lines 33-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have allowed the adjusting means of '836 to apply a negative pressure to draw undispensed material back into the nozzle at the end of dispensing in order to prevent clogging of the nozzles.

12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over '836 in view of '553 as applied to claim 1 above and further in view of '080 for substantially the same reasons as given for claim 50 above.

13. Claims 20 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 in view of '553 as applied to claim 1 above and further in view of Osaka '840.

'836 and '553 do not teach Applicant's specifically claimed ranges of the grain size, specific surface area, or paste viscosity.

'840 teaches that the particle size and viscosity of phosphor pastes are known to affect the light-emitting characteristics and resolution (col. 3, lines 8-39 and Abstract). The size distribution necessarily affects the specific surface area. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the size distribution, specific surface area and paste viscosity of '553 for the best light-emitting characteristics and resolution.

14. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over '836 in view of '553 as applied to claims 1 and 2 above and further in view of Igarashi et al. (U.S. Patent 4,792,723, hereafter '723).

'836 teaches the method of claims 1 and 2 as detailed above, but does not teach the use of terpineol as the solvent for the paste. However, terpineol is a conventional paste solvent for phosphor pastes. See, for instance, '723, col. 3, line 50-col. 4, line 6. Therefore, it would have

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been obvious to one of ordinary skill in the art at the time the invention was made to have used terpineol as the solvent of '836 with the expectation of similar results.

15. Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 in view of '553 as applied to claims 1 and 2 above and further in view of '231 and Mizuno et al. (U.S. Patent 5,466,325, hereafter '325).

'836 is described above. It does not teach that phosphor deposited on top of the barrier ribs are removed by an adhesive material. However, '553 explicitly teaches that phosphor is not desired on top of the barrier ribs of a plasma display panel (col. 12, lines 16-26). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have removed any phosphor accidentally deposited on top of the barrier ribs in the invention of '836. Further, '231 suggests the inclusion of a photosensitive material in a phosphor paste to allow photolithographic processing, as described in the rejection of claims 28 and 29 over '553 in view of '231, above. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used such a photolithographic process to have removed the undesired portions of the phosphor paste. In such a case, the phosphor paste acts like the photoresist of a conventional photolithographic process.

'325 teaches the patternwise removal of photoresist material from a substrate using a pressure-sensitive adhesive. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an adhesive to remove the undesired portion of the phosphor paste in the embodiment suggested by '836, '553, and '231 with the expectation of similar results.

16. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over '836 and '574 as applied to claim 33 above, and further in view of '553.

'836 and '574 teach the limitations of claim 33, but do not explicitly teach that the apparatus includes means to remove undesired deposits of phosphor paste. '553 explicitly teaches that phosphor is not desired on top of the barrier ribs of a plasma display panel (col. 12, lines 16-26). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have removed any phosphor accidentally deposited on top of the barrier ribs in the invention of '836.

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17. Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 and '574 as applied to claim 33 above, and further in view of Silverbrook (U.S. Patent 5,850,241, hereafter '241).

'836 and '574 teach the limitations of claim 33, but do not teach that the nozzle is coated with a fluorine-based resin or amorphous carbon film. '241 teaches that ink-jet nozzles may be coated with hydrophobic films such as an amorphous carbon film (col. 38, line 66-col. 39, line 30) to prevent reaction between the nozzle and polar solvent-based inks. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a hydrophobically coated nozzle in order to deposit the paste of '836 when the desired paste uses a polar solvent as a vehicle to prevent interactions between the paste and the nozzle. '241 teaches amorphous carbon and fluorinated diamond films. The Examiner takes official notice that fluoro-resins are notoriously well-known hydrophobic coatings. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a fluorinated resin as the hydrophobic coating material with the expectation of similar results.

#### ***Response to Arguments***

18. Applicant's arguments filed 4/18/02 have been fully considered but they are not persuasive.

Regarding the rejections under 35 USC 112, 2nd paragraph, Applicant's amendment addresses the previous rejection of claim 13, but introduces new language that renders the claim unclear. The Examiner maintains the rejection of claim 20 because the amendment to the specification does not clarify the language of the claim. The Examiner maintains the rejections regarding claims 35 and 44 because the amendment does not address the substance of the rejection, which is based on the reference to the properties of the substrate in the apparatus claim. That is, patentability of the apparatus as claimed depends on the position or features of the workpiece being acted upon. Applicant argues that the apparatus would not be used without a substrate without barrier ribs. The argument does not address the rejection. The apparatus may be used without such a substrate (e.g., a flat substrate) or with a workpiece in a different position. An amendment stating that the apparatus is capable of the uses of claims 35 and 44 would be considered.

Applicant's remarks regarding support for the new limitations are noted, but the provision of specific examples within a range does not support the entirety of the range. Further, the Examiner notes that Applicant's amendment to the spec. for which Applicant relies on for support for the limitation of "288 mm or more" lies outside the claimed range.

Nanto '836 as primary reference:

Applicant argues that '836 is not prior art under 35 USC 103(a) because of the foreign priority document JP 08-336,713, filed 12/17/1996. The current claims are not entitled to the foreign priority date because JP 08-336,713 does not provide full support as defined by 35 USC 112, 1<sup>st</sup> paragraph for the substance of any of the claims. Accordingly, there is no evidence that Applicant had possession of the claimed invention as of the date of the foreign priority document. See MPEP 2136.05.

Applicant's assertions regarding temperature control and "precise printing" are not convincing because temperature control is not claimed.

Applicant's arguments regarding the new limitation "barrier rib pitch of 360 microns or less" are unconvincing because '836 suggests a pitch of 220 microns. Applicant's arguments regarding the new limitation "arranged inline having a length of 288 mm or more" are unconvincing for the reasons detailed above.

Shinoda '553 as primary reference:

Applicant argues that '553 does not disclose a plurality of outlet holes formed in a line of 288 mm or more. The argument overcomes the rejection under 35 USC 102(b). The claim is rejected under 35 USC 103 because the use of a screen that covered the entire substrate would have been obvious, and because substrates at least 12 inches (> 288 nm) in width were known at the time of the invention, as discussed above.

***Conclusion***

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703)308-2331. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333.



Michael Cleveland  
5/10/02



SHRIVE P. BECK  
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